POLIVANOV, K.M.

SOV-5?-3-37/38

AUTHOR: Solomonov, M.

TITLE: Role and Importance of Magnetic Elements. Some Findings of the All-Union Conference on Magnetic Elements in Automation, Telemechanics and Computer Engineering (Rol' i znacheniye magnitnykh elementov. Nekotoryye itogi vsesoyuznogo soveshchaniya po magnitnym elementam avtomatiki, telemekhaniki i vychislitel'noy tekhniki)

PERIODICAL: Izvestiya Akademii Nauk SSSR. Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 3, pp 174-175 (USSR)

ABSTRACT: This conference was convened by the Institut avtomatiki i telemekhaniki Akademii nauk SSSR (Institute of Automatics and Telemechanics, Academy of Sciences USSR) and the Komissiya po magnitnym usilitelyam i beskontaktnym magnitnym elementam (Commission on Magnetic Amplifiers and Contactless Magnetic Devices). It was held on Nov. 20-30, 1957 with the participation of 800 delegates, representing 240 research and industrial organisations. In the plenary meetings the following papers were read: B. S. Sotskov on "Present state and problems of developing magnetic elements for automation and telemechanics"; K. M. Polivanov on "Dynamic characteristics of elements of electric circuits", R. V. Telesnin "The influence of magnetic viscosity on the process of remagnetization of cores"; M. A.

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24-58-3-37/38

Role and Importance of Magnetic Elements. Some Findings of the All-Union Conference on Magnetic Elements in Automation, Telemechanics and Computer Engineering.

Rozenblat on "Certain factors influencing the static and dynamic characteristics of toroidal cores"; E. T. Chernyshev, N. G. Chernysheva and E. N. Chedurina on "Present state of the problem of testing magnetic materials in dynamic regimes"; M. A. Rozenblat and O. A. Sedykh on "Fundamental principles of constructing (type) series of toroidal cores for magnetic amplifiers and contactless magnetic elements". A number of papers were read in two sections (magnetic amplifiers and discrete magnetic elements). Altogether 80 papers and communications were presented. These showed that in recent years successful results were obtained in the Soviet Union in the field of theory, development and application of various types of magnetic elements to automation, telemechanization and computer engineering. Application of magnetic elements brings about a considerable improvement in reliability and simplifies the design and operation of equipment. Depending on the type of the apparatus, use of static magnetic elements instead of electronic tubes, relays, amplidynes,

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Role and Importance of Magnetic Elements. Some Findings of the All-Union Conference on Magnetic Elements in Automation, Telemechanics and Computer Engineering. 24-58-3-37/38

etc. results in an increase in efficiency, reduction of dimensions, increased speed of response, a reduced power consumption, an increase in sensitivity and a reduction in the costs of apparatus and various other advantages. Simultaneous utilization of magnetic amplifiers and semiconductors will enable the solution of complicated technical problems and opens up wide prospects for further improvement of apparatus used in automation, remote control, computer and communication engineering.

Card 3/3

1. Telemechanics and Computer Engineers--Conference--USSR

SOV/142-58-4-21/30

AUTHOR: Professors: Polivanov, K.M., Netushil, A.V., Fradkin, P.M.

TITLE: A Symposium of Scientific Essays of the Belorussian Polytechnic Institute imeni I.V.Stalin, Nr 61, "Power- and Electrical Engineering," 1957. (Sbornik nauchnykh trudov Belorusskogo Politekhnicheskogo instituta imeni I.V. Stalina, Vypusk 61, Energetika, Elektrotekhnika, 1957)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Radiotekhnika, 1958, Nr 4, pp 510-511 (USSR)

ABSTRACT: This is a review of the above mentioned book.

SUBMITTED: April 21, 1958

Card 1/1

POLIVANOV, K.M.

Surface effect in ferromagnetic materials with a rectangular loop in the presence of viscosity. Izv. vys. ucheb. zav.; elektromekh. 1 no.5:3-13 '58. (MIRA 11:8)
(Ferromagnetism)

POLIVANOV, K.M., prof., doktor tekhn.nauk

Voltage, electromotive force and potential difference. Trudy MEI no.27:3-22 '58. (MIRA 13:4)
(Electric engineering--Terminology)

Polivanov K.M.

AUTHOR: Polivanov, K. M. 20-1-23/58

TITLE: The Dynamic Characteristics of Electric Circuit Elements (Dinamicheskiye kharakteristiki elementov elektricheskikh tsepey).

PERIODICAL: Doklady AN SSSR 1958, Vol. 118, Nr 1, pp. 80-83 (USSR)

ABSTRACT: The characteristics of non-linear elements of electric circuits with quasi-static operation are represented by a dependence of the type y(x), e.g. by i(u), ψ(i), q(u) for the inductivity with ferromagnetic core resp. for a condenser with a seignette electric. In the general case the dependence between the same magnitudes with dynamic conditions is different. The form of the dynamic characteristics depends on the form of the temporal change of the independent variables. Then an equation is put down for a hyperplane in the phase space which can be called a characteristic plane C or a plane of dynamic equilibrium. The knowledge of plane C makes possible the determination of the reaction of the y element with a random form of impulse y(x). Similar to the determination of the curve with quasi-static conditions as characteristics of the element the characteristic plane C can be determined from the experiment with dynamic conditions. Only with a linear system C is a plane. In the

non-linear case more experimental data are, of course, necessary than in the linear case. With the systematic order of the results of observation the points can be found which determine the position of the plane C in the area of interest. If there is an hysteresis the whole space is passed by the planes of the single cycles. Even with insufficient exactness the supplementation of the plane characteristics (e.g. to a three-dimensional plane) approaches the characteristics of the element to the real characteristics. The author points at another possibility of precizing the characteristics. As example for the three-dimensional characteristics the not-plane surface described by the equation of viscosity (which was extended to a non-linear system) can be regarded. Such an equation is mentioned for an inductivity with ferromagnetic core. The equations given here have as limit the statistic curve and can easily be integrated. But they do not always express the characteristics of the transition process. The method for the analysis of unsteady processes shown by means of samples from the field of electric circuits, can also be used in other fields of physics, e.g. for the investigation of mechanic shock strength. There are 3 figures and 4 references, 1 of which is Slavic.

24 (3)

AUTHORS: Polivanov, K. M., Kolli, Ya. N., Soboleva, L. P. SOV/48-23-3-8/34

TITLE: Permeability and Losses of Magnetodielectrics (Pronitsayemost' i poteri magnetodielektrikov)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 3, pp 311-317 (USSR)

ABSTRACT: It is known (Ref 1) that the measured apparent loss angle tangent $tg\,\delta_\mu$ within the Rayleigh limit of the field depends on the potential amplitude of the field N_t and on the frequency ω:

$$tg\,\delta_\mu = a_o + a_1 N_t + a_2 \omega$$

In the present paper these components were analyzed at a sinusoidal change of the field and at relatively low frequency. The problem of the derivation of the formulas which connects the average permeability of the magnetodielectric with magnetic permeability of the ferromagnetic phase at a sinusoidal change of the field was investigated already in detail (Refs 6, 7 and 8). At a weak concentration all these

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formulas yield similar results. In the present paper the generalisation was made according to the formula by Lichtecker

$$\mu_\cdot = \mu_{equiv}^{p} = \left|\mu_{equiv}\right| e^{-\delta}$$

for small angles $tg\delta_{\mu.} = p\ tg\delta_{equiv}$ may be written instead of $\delta_{\mu.} = p\delta_{equiv}$. $tg\delta_{\mu.}$ consists of the same components as $p\ tg\delta_{equiv}$ each of them, however, being changed p times. On the basis of the analysis carried out the following method for the division of the losses may be suggested: 1) $tg\delta\bar{\mu} = f(\omega)$ is taken at N_t = const (Figure). 2) The experimental curve is extrapolated to $\omega = 0$. The section on the axis of ordinates which is separated by the curve is equated at corresponding N_t value to the hysteresis loss angle. 3) From the kown μ_r (initial permeability), μ_1, r (radius of the spherical particle), p (duty factor), a, b (diameter of the toroid) and individually measured σ and σ, the eddy current losses are computed as linear frequency functions. 4) The loss angle of magnetic viscosity is determined as the difference between

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the experimental curve and the sum of the hysteresis loss and the eddy current losses. 5) A family of curves $tg\delta_{\bar{\mu}} = f(\omega)$ for different N_t is necessary for the division of the angular tangent of the hysteresis losses into the initial component a_0 and the Rayleigh component which depends on $N_t(a_1 N_t)$. By extrapolating them to $\omega = 0$ and by plotting the curve $tg\delta_{\bar{\mu}} = \varphi(N)$ at $\omega \rightarrow 0$ the section which was separated by the drawn straight line on the axis of ordinates is found. The section is equal to a_0 and the inclination of the straight line determines the quantity a_1. There are 1 figure and 10 references, 7 of which are Soviet.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Institute of Power Engineering)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341810018-4"

LOMONOSOV, Vsevolod Yur'yevich; POLIVANOV, Konstantin Mikhaylovich; Prinimali uchastiye: SHAMAYEV, Yu.M.; ~~VITKOV, M.G.; POLIVANOV, Konstantin Mikhaylovich.~~ ANTIK, I.V., red.; BORUNOV, N.I., ~~tekhn.red.~~

[Electrical engineering; basic concepts] Elektrotekhnika; osnovnye poniatiia. Izd.9., perer. Moskva, Gos.energ.izd-vo, 1960. 391 p. (MIRA 13:9)

(Electric engineering)

POLIVANOV, K. M.

PHASE I BOOK EXPLOITATION SOV/4893

Vsesoyuznoye soveshchaniye po fizike, fiziko-khimicheskim svoystvam ferritov i fizicheskim osnovam ikh primeneniya. 3d, Minsk, 1959

Ferrity; fizicheskiye i fiziko-khimicheskiye svoystva. Doklady (Ferrites; Physical and Physicochemical Properties. Reports) Minsk, Izd-vo AN BSSR, 1960. 655 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agencies: Nauchnyy sovet po magnetizmu AN SSSR. Otdel fiziki tverdogo tela i poluprovodnikov AN BSSR.

Editorial Board: Resp. Ed.: N. N. Sirota, Academician of the Academy of Sciences BSSR; K. P. Belov, Professor; Ye. I. Kondorskiy, Professor; K. M. Polivanov; Professor; R. V. Telesnin, Professor; G. A. Smolenskiy, Professor; N. N. Shol'ts, Candidate of Physical and Mathematical Sciences; E. M. Smolyarenko; and L. A. Bashkirov; Ed. of Publishing House: S. Kholyavskiy; Tech. Ed.: I. Volokhanovich.

PURPOSE: This book is intended for physicists, physical chemists, radio electronics engineers, and technical personnel engaged in the production and use of ferromagnetic materials. It may also be used by students in advanced courses in radio electronics, physics, and physical chemistry.

COVERAGE: The book contains reports presented at the Third All-Union Conference on Ferrites held in Minsk, Belorussian SSR. The reports deal with magnetic transformations, electrical and galvanomagnetic properties of ferrites, studies of the growth of ferrite single crystals, problems in the chemical and physicochemical analysis of ferrites, studies of ferrites having rectangular hysteresis loops and multicomponent ferrite systems exhibiting spontaneous rectangularity, problems in magnetic attraction, highly coercive ferrites, magnetic spectroscopy, ferromagnetic resonance, magneto-optics, physical principles of using ferrite components in electrical circuits, anisotropy of electrical and magnetic properties, etc. The Committee on Magnetism, AS USSR (S. V. Vonsovskiy, Chairman) organized the conference. References accompany individual articles.

Ferrites (Cont.) SOV/4893

Card 11/18

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APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341810018-4"

POLIVANOV, K. M.

PHASE I BOOK EXPLOITATION SOV/4893

Vsesoyuznoye soveshchaniye po fizike, fiziko-khimicheskim svoystvam ferritov i fizicheskim osnovam ikh primeneniya. 3d, Minsk, 1959

Ferrity; fizicheskiye i fiziko-khimicheskiye svoystva. Doklady (Ferrites; Physical and Physicochemical Properties. Reports) Minsk, Izd-vo AN BSSR, 1960. 655 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agencies: Nauchnyy sovet po magnetizmu AN SSSR. Otdel fiziki tverdogo tela i poluprovodnikov AN BSSR.

Editorial Board: Resp. Ed.: N. N. Sirota, Academician of the Academy of Sciences BSSR; K. P. Belov, Professor; Ye. I. Kondorskiy, Professor; K. M. Polivanov; Professor; R. V. Telesnin, Professor; G. A. Smolenskiy, Professor; N. N. Shol'ts, Candidate of Physical and Mathematical Sciences; E. M. Smolyarenko; and L. A. Bashkirov; Ed. of Publishing House: S. Kholyavskiy; Tech. Ed.: I. Volokhanovich.

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Card 1/18

Ferrites (Cont.) SOV/4893

Card 16/18

9.7100
9.4300 (1154, 1161, 1385)

30108
S/194/61/000/007/016/079
D201/D305

AUTHOR: Polivanov, K.M.

TITLE: Parametrons with anisotropic non-linear coupling discs

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1961, 47, abstract 7 V344 (V sb. Vses. Mezh-vuz. konferentsiya po teorii i metodam rascheta nelineyn. elektr. tsepey, no. 6, Tashkent, 1960, 47-60)

TEXT: Fast acting computers are considered with thin magnetic films, having thickness from a few hundred to a few thousand Å. When compared with solid ferrite cores, those films exhibit a much faster magnetic polarity reversal. The films may be used for circuit elements performing complex logic functions, e.g. for parametrons with thin coupling discs. In the analyzed coupling disc not

Card 1/2

POLIVANOV, K.M.; RODICHEV, A.M.; IGNATCHENKO, V.A.

Effect of the parameters of ferromagnetic materials on the Barkhausen Effect measurements. Fiz. met. i metalloved 9 no.778-789 My '60. (MIRA 14:4)

1. Institut fiziki AN SSSR.
(Ferromagnetism)

S/126/60/009/05/019/025
E032/E314

AUTHORS: Polivanov, K.M., Rodichev, A.M. and Ignatchenko, V.A.

TITLE: The Effect of the Parameters of Ferromagnetics on the Measurements of the Barkhausen Effect

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 5, pp 778 - 789 (USSR)

ABSTRACT: The Barkhausen effect is usually studied by measuring the emf induced in a coil surrounding the ferromagnetic specimen. The emf pulses induced in this coil by discontinuous changes in the magnetization are the only source of information about this phenomenon. The time interval between successive pulses can be made quite large by a suitable choice of the linear dimensions of the specimen and the rate of change in the magnetic field H . Under such conditions each emf pulse corresponds to a single discontinuity. The present paper is concerned with the determination of the relationship between the pulse parameters and the volume of the region in the ferromagnetic within which the discontinuous change in the magnetization takes place, the increase in the magnetization, the change in the magnetic moment, the duration and the rate

Card 1/2

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341810018-4"

NEYMAN, Leonid Robertovich; DEMIRCHYAN, Kamo Seropovich; POLIVANOV, K.M., prof., retsenzent; FRADKIN, B.M., dots., retsenzent; KUPALYAN, S.D., dots., retsenzent; PERKOVSKAYA, G.Ye., red.; MURASHOVA, V.A., tekhn. red.

[Laboratory manual on electromagnetic fields] Rukovodstvo k laboratorii elektromagnitnogo polia. Moskva, Gos. izd-vo "Vysshaia shkola," 1961. 219 p. (MIRA 15:4)
(Electric engineering--Handbooks, mauals, etc.)
(Electric fields) (Magnetic fields)

S/196/62/000/013/001/018
E194/E155

AUTHORS: Belyavskiy, V.F., and Polivanov, K.M.

TITLE: The surface effect in an anisotropic lamina

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no.13, 1962, 5, abstract 13 A 31. (Tr. Mosk. energ. in-ta, no.37, 1961, 3-15).

TEXT: A study is made of the surface effect in a sufficiently thin and narrow ferromagnetic tape whose anisotropy is characterised by differences in the permeability along mutually orthogonal axes lying in the plane of the tape and not coincident with its geometrical axes. The tape is subject to the influence of an external harmonic magnetic field whose complex vector of field intensity is parallel to its longitudinal geometrical axis. Mean values of permeability are calculated along the axes of anisotropy and also the complex vector of mean induction. It is shown that the vector of the resultant magnetic field intensity on the tape surface is of continually varying direction; the locus of the ends of the field intensity vector on the surface is an ellipse, which

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36942
S/142/61/004/006/003/017
E192/E382

94.2200

AUTHORS: Polivanov, K.M., Dyatlov, V.L. and Vitkov, M.G.

TITLE: Analysis of the remagnetization process taking into account the surface phenomena and dynamic properties of the material

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, v. 4, no. 6, 1961, 653 - 657

TEXT: In general, consideration of the surface phenomena and the remagnetization process in nonlinear ferromagnetics is a very complex problem. However, in the case of a medium characterized by a rectangular hysteresis loop the process can be easily analyzed by the method devised by W. Wolman and H. Kaden (Ref. 1 - Zs. f. techn. Phys., 1932, no. 7, 330). The results of analysis and experiment are in good agreement in this case, provided that the remagnetization process can be described by the static characteristic of the material. It was found by V.K. Arkad'yev (Ref. 2 - Electromagnetic processes in metals (Elektromagnitnyye protsessy v metallakh), ONGI, 1936)

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very simple:

$$dB/dt = F(B)(H - H_c) \tag{4}$$

The field is expressed as:

$$H + H_e + H_{B.T}$$

where H_e is the external vield and

$H_{B.T}$ is the eddy-current field.

It is shown that for a plate of thickness $2a$ the external-field impulse necessary for full remagnetization of the plate is expressed by:

$$\bar{I}_e = \bar{I} + \sigma a^2 B_o \tag{6}$$

where $\bar{I}$ is the current impulse in the material necessary for remagnetization; this is equal to the external-field impulse in the absence of eddy currents (absence of surface effect). Similarly, it is shown that for a cylindrical medium having a radius a, the external field impulse is given by:

$$\bar{I}_e = \bar{I} + \frac{\sigma a^2}{2} B_o \qquad (7).$$

By analyzing the above formulae it is concluded that the dynamic characteristics of the ferromagnetic material in the form of rings or tapes are insignificant in comparison with the surface effect if $\sigma a^2 B_o \gg \bar{I}$. The above results are in reasonable agreement with experiment. There are 2 figures.

ASSOCIATION: Kafedra teoreticheskikh osnov elektrotekhniki Moskovskogo ordena Lenina energeticheskogo instituta (Department of Theoretical Principles of Electrical Engineering of the Moscow Order of Lenin Power-engineering Institute)

SUBMITTED: May 9, 1961

Card 4/4

[redacted]

24,2200

25787
S/048/61/025/005/001/024
B104/B201

AUTHORS: Polivanov, K. M. and Frumkin, A. L.

TITLE: Thin magnetic films in modern physics and technology

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 5, 1961, 566-568

TEXT: The present investigation was the subject of a lecture delivered at a symposium on thin ferromagnetic films (Krasnoyarsk, July 4 to 7, 1960). The thin magnetic films consist here of ferromagnetic substances about 10^3 Å thick. These magnetic films differ as to their magnetic properties from massive magnets: (1) they possess, in their thickness, only one domain at a time, with the magnetization vector always lying in their plane under static conditions; (2) the demagnetization factor of the films in their plane is exceedingly small (in the range from 10^{-4} to 10^{-5}) and equal to unity in the direction of the normal; (3) eddy currents are absent in the films up to super-high frequencies; (4) because of the particular domain structure the ferromagnetic resonance of the

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B104/B201

Thin magnetic films in modern ...

films is by 10 to 100 times higher than that of the massive magnets; correspondingly, a high permeability is conserved at high frequencies; (5) the films exhibit a very high rate of magnetic reversal with pulsed and sinusoidal alternating fields, with the losses being very low; (6) many films exhibit in their plane a very pronounced magnetic anisotropy; (7) many films display a rectangular hysteresis loop. The development of nonmetallic ferromagnetic substances (ferrites) is dealt with, and two important tendencies of this development are indicated. One serves the purpose of obtaining ferromagnetic substances of an extremely high resistivity. The other is for producing the thinnest possible ferromagnetic materials. In both cases, the absence of eddy currents plays an essential part. Owing to the domain structure that is characteristic of magnetic films, and to the magnetization dynamics, novel possibilities of their application in research and in the industry arise. Due to the circumstance that the substance in such a magnetic film appears in a "two-dimensional" state, one of these dimensions being considerably smaller than the other, possibilities of application arise, e.g., in the study of spin waves in films or of the direct voltage appearing at the ends of the film on the incidence of a shf energy. Of great interest for the theory

Card 2/3

ANDREYEV, Georgiy Pavlovich; ANDREYEV, Sergey Nikolayevich; BOGOLYUBOV, Valentin Yevgen'yevich; BURDAK, Nadezhda Mironovna; ZHUKHOVITSKIY, Boris Yakovlevich; ZEVEKE, Georgiy Vasil'yevich; KARAYEV, Ruben Iosifovich; LEVITAN Semen Arkad'yevich; MUKHIN, Aleksandr Andreyevich; NEGNEVITSKIY, Iosif Borisovich; PEREKALIN, Mikhail Aleksandrovich; POLIVANOV, Konstantin Mikhaylovich, prof., doktor tekhn.nauk; FRIDKIN, L.M., tekhn. red.

[Problems of theoretical principles of electrical engineering; theory of networks]Zadachnik po teoreticheskim osnovam elektrotekhnik; teoriia tsepei. [By]G.P.Andreev i dr. Moskva, Gosenergoizdat, 1962. 159 p. (MIRA 15:12)
(Electric engineering) (Electric networks)

41423

S/142/62/005/004/001/010
E192/E382

AUTHORS: Polivanov, K.M., Zharkov, F.P. and Sokolov, V.A.

TITLE: Parametron with ferromagnetic cores. Part 1. Equation of the parametron and its analysis for steady-state conditions

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, v. 5, no. 4, 1962, 417 - 430

TEXT: The parametron considered is of the type first investigated by N.D. Papaleksi in 1931 and is shown in Fig. 1. The parametric windings are connected in series and connected to the supply source. The resonant windings are also connected in series but in opposition to the parametric windings. The resonant windings are "shorted" by a capacitor. The losses in the resonant circuit can be taken into account by introducing an equivalent resistance connected in series or in parallel with the capacitor. Analysis of the system is based on the works of A.A. Andronov and M.A. Leontovich (ZhTF, 1927, 59, no. 5-6) and others and on the recent work of R.M. Kantor (Izv. vuzov SSSR - Radiotekhnika, 1961, 4, no. 3, 285).

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The final equation describing the operation of the system is:

$$\frac{di}{d\tau} = -\left[\lambda(i_p - i) + \lambda(i_p + i)\right]\frac{di}{d\tau} +$$

$$+\left[\lambda(i_p - i) - \lambda(i_p + i)\right]\frac{di_p}{d\tau} - \frac{1}{Q}i - \frac{1}{\nu^2}\int i\,d\tau \qquad (10)$$

where

$$\lambda = \frac{\ell}{L}; \quad \tau = \omega t; \quad Q_o = \frac{\omega_o L}{r}; \quad \omega_o^2 = \frac{1}{LC}; \quad \nu = \frac{\omega}{\omega_o};$$

$$Q = \frac{\omega L}{r} = \nu Q_o \qquad (9),$$

in which the following notation is adopted: i is the current in the resonant circuit; $i_o + i_p = i_o + I_p \sin 2\omega t$ is the parametric excitation current; i_o is the DC component determining the operating point on the magnetic characteristic;

i_p is the alternating component (pump signal); $L = 2L(i_o)$ where the inductances are defined by

$$\omega \frac{d\Phi_1}{di} = L(i_o + i_p - i) = L(i_o) + l_1, \quad \omega \frac{d\Phi_2}{di} = L(i_o + i_p + i) = L(i_o) + l_2, \tag{4}$$

where $l_1 = l(i_p - i)$, $l_2 = l(i_p + i)$,

in which $\Phi_{1,2}$ is the magnetic flux of the first and second core, respectively. Eq. (10) can be solved by using the method of slowly-changing amplitudes. For this purpose, it is assumed that:

$$\lambda(i_{ab}) = -a_1 i_{ab} + a_2 i_{ab}^2 \tag{11}$$

where

$$i_{a,b} = i_p \pm i .$$

The current in the resonant circuit can be assumed as being sinusoidal:

$$i = I \cos \Theta \tag{12}$$

where:

$$\Theta = \omega t + \vartheta = \tau + \vartheta .$$

By using expressions (11) and (12), Eq. 10 is transformed into two equations, one of which determines the amplitude and the other the phase of the current in the system. These equations are:

$$\frac{dI}{d\tau} = \frac{1}{2} I \left[a_1 I_p \cos 2\vartheta - \frac{1}{Q} \right] \tag{22}$$

$$\frac{d\vartheta}{d\tau} = -\frac{1}{2} \left[a_1 I_p \sin 2\vartheta + 1 - \frac{1}{\nu^2} + a_2 \left(I_p^2 + \frac{1}{2} I^2 \right) \right] \tag{23}$$

The solutions of Eqs. (22) and (23) can easily be found for the steady state and it is shown that the current is given by:

$$I^2 = \frac{2}{a_2} \{ \mp R(\nu) + S(\nu) \} S \tag{27б}$$

where

$$R(\nu) = \sqrt{(a_1 I_p)^2 - \frac{1}{Q^2}} \; ; \quad S = \frac{1}{\nu^2} - 1 - a_2 I_p^2 \tag{28}$$

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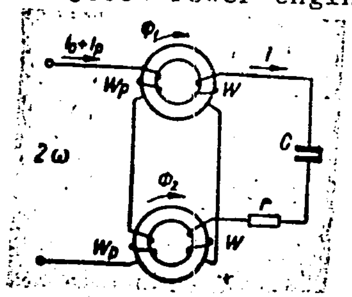
Eq. (27б) is used to investigate the amplitude of the current as a function of the normalised frequency ν for $a_2 > 0$. The stability and the conditions of existence of the solutions for $a_2 > 0$ are also investigated. The effect of losses and the amplitude of the oscillations as a function of frequency for $a_2 < 0$ are also studied. There are 8 figures.

ASSOCIATION: Kafedra teoreticheskikh osnov elektrotekhniki Moskovskogo energeticheskogo instituta (Department of Theoretical Principles of Electrical Engineering of Moscow Power-engineering Institute)

SUBMITTED: January 29, 1962

Fig. 1:



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E192/E382

9.2572

AUTHORS: Polivanov, K.M., Zharkov, F.P. and Sokolov, V.A.

TITLE: Parametron with ferromagnetic cores
Part II. Representation of the parametron states on the Van-der-Pol plane; transients

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiotekhnika, v. 5, no. 5, 543 - 551

TEXT: Part I of the article, with equations up to (67) (inclusive), was published in no. 4 issue, 1962, of this journal; the notation adopted in Part II is the same as in the previous article. For the purpose of representation of the parametron equations in the Van-der-Pol plane, a current vector is defined as:

$$I e^{j\vartheta} = U + jV \tag{68}$$

where $U = I\cos\vartheta$ and $V = I\sin\vartheta$.

The differential equations of the system thus become

$$\frac{dU}{d\tau} = \frac{1}{2}\left\{\left(a_1 I_p - \frac{1}{Q}\right)U - SV + \frac{a_2}{2} I^2 V\right\} \tag{70}$$

Card 1/4 S/142/62/005/...

S/142/62/005/005/001/009
E192/E382

$$\frac{dV}{d\tau} = -\frac{1}{2}\left\{\left(a_1 I_p + \frac{1}{Q}\right)V - SU + \frac{a_2}{2} I^2 U\right\} \quad (71) .$$

These two equations can be solved comparatively easily if the differential inductance is assumed to be linear, i.e.

$$\lambda(i_{ab}) = - a_1 i_{a_1 b} \quad (72) .$$

In this case, the transient time is given by:

$$\bar{\tau} = \frac{\ln \frac{2}{a_2}\left\{\sqrt{(a_1 I_p)^2 - \frac{1}{Q^2}} - I_p^2 a_2\right\} - 2 \ln U_o}{a_1 I_p - 1/Q} \quad (76).$$

However, comparison of Eq. (76) with experiment showed that the measured transient time exceeded the calculated one by about three to four periods T . Eqs. (70) and (71) cannot be integrated directly but numerical integration by using the Adams-Krylov method is possible. Such integration was carried out for the following parameters:

$$a_1 = 3, \quad a_2 = 15, \quad \nu = 1, \quad Q_o = 5, \quad I_p = 0.1a \tag{79}$$

and it was found that the transient time was $\tau = 14\,T$; on the other hand, the experimental value was $(11 - 13)T$. A complete description of the system can be given by constructing a set of curves representing the movement of the point which describes the state of the system. This is done by mapping "the field" of the system in U, V plane. The principal equation for the mapping is obtained by dividing Eq. (70) by (71). An example of such curves in U,V plane for $\nu = 1$ is shown in Fig. 10.

Two singular points Y_1 and Y_2 can be seen in this figure; these correspond to the steady-state equilibrium. The system is also investigated for the case when $Q \to \infty$ by mapping Eqs. (70) and (71) in U, V plane; the locus of the stable equilibrium points for various ν is determined and the conditions of strong excitation (unlike those represented by the curves of Fig. 10) are investigated. There are 17 figures.

X

Parametron with S/142/62/005/005/001/009
E192/E382

ASSOCIATION: Kafedra teoreticheskikh osnov elektrotekhniki Moskovskogo energeticheskogo instituta (Department of Theoretical Principles of Electrical Engineering of the Moscow Power-engineering Institute)

SUBMITTED: January 29, 1962

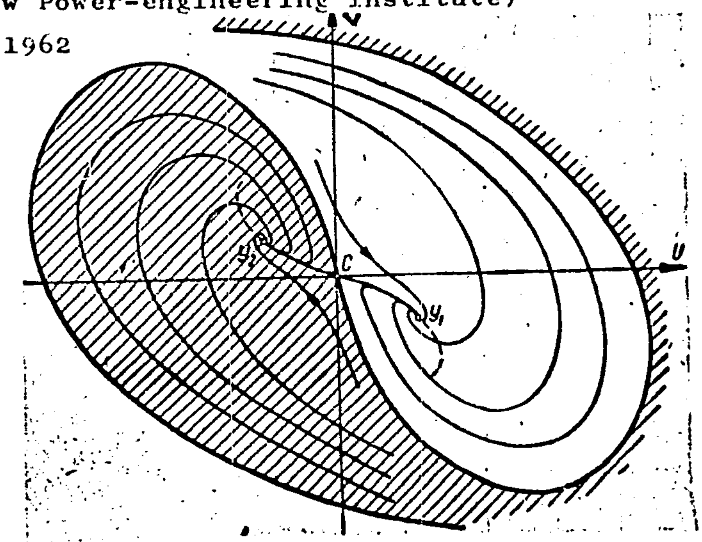

Fig. 10

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S/126/62/014/002/002/018
E032/E514

24,2200

AUTHORS: Polivanov, K.M. and Frumkin, A.L.

TITLE: Differential susceptibility of thin magnetic films with uniform rotation of the magnetization

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.2, 1962, 165-171

TEXT: The aim of this work was to calculate the susceptibility of films with arbitrary anisotropy under static conditions in the presence of a sinusoidal test field. The calculations are confined to the case of uniformly magnetized film, and are illustrated in the figure. It is required to calculate the susceptibility with respect to the test field $\underline{H}_{\Pi}$ when in addition to this field there is also a constant arbitrary field $\underline{H}_o$. Suppose that $\underline{H}_o$ and $\underline{H}_{\Pi}$ are at angles α and β to the direction of easy magnetization. It is assumed that the magnetic anisotropy energy E_a is known as a function of the angle φ between the direction of easy magnetization and the magnetization vector $\underline{I}$. When the test field $\underline{H}_{\Pi}$ is very small, the susceptibility $\chi = dI_{\Pi}/dH_{\Pi}$ is given by

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$$\chi = I^2 \frac{\sin^2(\beta - \varphi_o)}{\left.\frac{d^2E}{d\varphi^2}\right|_{\varphi=\varphi_o}} \quad (6)$$

where dI_Π is the increase in $\underline{I}$ in the direction of $\underline{H}_\Pi$ due to $d\underline{H}_\Pi$, φ_o is the equilibrium value of φ which is determined by the anisotropy and the constant magnetic field and E is the magnetic energy of the film due to both the anisotropy and the external field. The analysis is then confined to films whose anisotropy may be described by $E_a = K \sin^2 \varphi$ (7). The above expression for the susceptibility holds only when the angle φ does not lie in the neighbourhood of points for which

$$\frac{d^2E_a}{d\varphi^2} + I H_o \cos(\alpha - \varphi) = 0, \quad (5)$$

In the general case the expression for χ is somewhat more complicated. Subject to this restriction the so-called reduced susceptibility, i.e. the susceptibility divided by $I^2/2K$, turns out to be

$$\chi_{\Pi p} = \frac{\sin^2(\beta - \varphi_o)}{\cos 2\varphi_o + h_o \cos(\alpha - \varphi_o)} \tag{8}$$

where $h_o = H_o/2K$. When Eq.(5) is satisfied it is found that for small values of the test field

$$\sin\varphi_o \cos\varphi_o - h_o \sin(\alpha - \varphi_o) = 0 \tag{9}$$

In general, φ_o cannot be determined analytically from this result but graphical methods are possible and hence a numerical determination of the susceptibility of films with anisotropy given by Eq.(7) is always possible for any orientation of the magnetizing and test fields. The second part is concerned with the complex susceptibility in the radiofrequency range. Using an expression given by D. O. Smith (J. Appl.Phys., 1958, 29, 264) for the free motion of the magnetization vector, an expression is obtained for the complex susceptibility in a sinusoidal test field and this is then applied to films for which Eq.(7) holds. There is 1 figure.

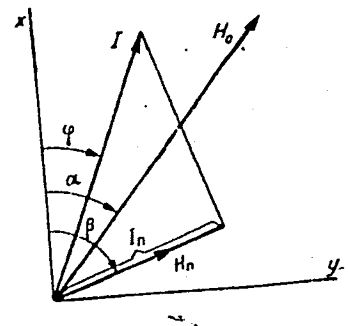
Card 3/4

Differential susceptibility ... S/126/62/014/002/002/018
E032/E514

ASSOCIATION: Moskovskiy energeticheskiy institut
(Moscow Power Engineering Institute)

SUBMITTED: February 19, 1962

Figure



Card 4/4

POLIVANOV, K.M.; FRUMKIN, A.L.

Methods of investigating the magnetic properties of thin magnetic films in static and quasi-static conditions. Trudy inst. Kom.stand.mer i izm. prib no.64:278-288 '62. (MIRA 16:5)
(Magnetic measurements—Equipment and supplies)

L 17115-63 EWT(1)/EWP(q)/EWT(m)/BDS AFFTC/ASD GG/JD

ACCESSION NR: AP3002843 S/0126/63/015/006/0846/0853

58
57

AUTHORS: Polivanov, K. M.; Frumkin, A. L.

TITLE: Measurement of magnetic moment in thin magnetic films by the torsional vibration method

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 6, 1963, 846-853

TOPIC TAGS: magnetic moment, thin film, torsional vibration method

ABSTRACT: The magnetic moment in thin films has been measured by using the Gauss torsional vibration method which makes it possible to determine the absolute value of the moment and provides for the investigation of arbitrary magnetization curves under static conditions. The problem was formulated as follows: a film placed on a plate is suspended on a thread so that the plane of the film is vertical. A magnetic field H acts in the horizontal plane and is directed along the film in a static equilibrium. The equation for free torsional oscillations of the film around the thread is:

$$K\ddot{\alpha}+P\dot{\alpha}+MH\sin(\alpha-\gamma)+C\alpha=0, \quad (1)$$

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ACCESSION NR: AP3002843

where K is the moment of inertia of the sample with respect to the thread, α is angle of the sample's declination from the static equilibrium position, P is attenuation coefficient, γ is the angle at which the vector M declines from the film under the action of H at given α, and C is the elastic constant of the thread. The formulas for the natural sample oscillations, for the magnetic moment, and for the evaluation of relative sensitivity toward the field variation are derived. The authors conclude that the torsional vibration method is the simplest and the most accurate method for the determination of magnetic moment and static magnetization curves of thin films. Orig. art. has: 7 formulas and 3 figures.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute)

SUBMITTED: 30Oct62 DATE ACQ: 23Jul63 ENCL: 00

SUB CODE: ML, PH NO REF SOV: 008 OTHER: 013

Card 2/2

POLIVANOV, K.M., doktor tekhn.nauk, prof.; BORCHANINOV, G.S., kand.tekhn.nauk, dotsent; TSUGULYA, A.F., kand.tekhn.nauk, dotsent; NECHAYEV, B.V., inzh.

Study of the electrical characteristics of three-phase current conductors using single-phase mode techniques. Izv.vys.ucheb. zav.; energ. 8 no.10:29-34 O '65. (MIRA 18:10)

1. Moskovskiy ordena Lenina energeticheskiy institut. Predstavlena kafedroy elektricheskikh stantsiy.

L 11206-66 EWT(d) IJP(c)

ACC NR: AP6001931 SOURCE CODE: UR/0142/65/008/006/0637/0646 46

44 55 44 55 43

AUTHOR: Polivanov, K. M.; Zharkov, F. P. B

ORG: none

TITLE: Vector analysis of phase plane

SOURCE: IVUZ. Radiotekhnika, v. 8, no. 6, 637-646

TOPIC TAGS: vector analysis, automatic control system

ABSTRACT: The article proves that stability criteria of singular points can be found by vector-analysis operations applied to the velocity field of a state point. Any process describable by a second-order equation can be represented as a plot of velocity vs. position on a phase (state) plane (an example of pendulum motion is given). It is shown that general characteristics of a velocity field carry essential information on solution of the system describable by a second-order equation. The nature of singular points (stable or unstable node or focus, center, saddle) is discerned by applying certain rules to div $\underline{v}$ and $rot_z \underline{v}$. The phase-plane representation can also be used for describing processes in other nonvelocity-type

Card 1/2 UDC: 621.372.061

2

L 25899-66 EWT(1)/T IJP(c) GG

ACC NR: AP6010402 SOURCE CODE: UR/0126/66/021/003/0367/0373

AUTHORS: Polivanov, K. M.; Frumkin, A. L.

65
62
B

ORG: Moscow Power Institute (Moskovskiy energeticheskiy institut)

TITLE: The effective permeability of thin magnetic films as a function of the amplitude of a radio-frequency field

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 3, 1966, 367-373

TOPIC TAGS: magnetic permeability, permeability measurement, permalloy, oscillator, hysteresis loop, magnetic hysteresis, magnetic moment, rf field/ GSS-6 oscillator

ABSTRACT: The complex permeability of permalloy films as a function of the amplitude of a radio-frequency field at frequencies on the order of 10^6 Hz is studied. The method of radio-frequency measurements differed little from that described earlier by K. M. Polivanov and A. L. Frumkin (Tr. Komiteta standartov, mer i izmeritel'nykh priborov, No. 64 (124), M-L., Standartgiz, 1962, p. 278). The resonant circuit was powered by a GSS-6 oscillator. The standard specimen of 80-20 permalloy had a thickness of 1040 Å. An increase in the real and imaginary parts of the permeability as a function of field strength was observed (see Fig. 1). The radio-frequency losses were proportional to the area of the static hysteresis loop (see Fig. 2). It is concluded that in the phenomenological dynamic equation of magnetization of the film the coefficient taking attenuation into account is a function of the angle of

UDC: 539.216.2:538.213

2

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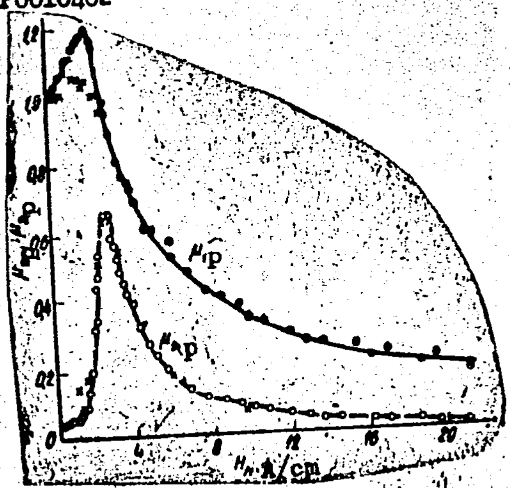

Fig. 1. Real μ_{1p} and imaginary μ_{2p} parts of complex permeability of permalloy film as a function of strength of alternating field acting along transverse axis. Superposed magnetizing field absent. Frequency 1.5 MHz. X--values of μ_{1p} and μ_{2p} calculated on basis of static measurements. Values of μ_{2p} obtained from statics are multiplied by 5.6.

deviation. The authors thank I. A. Miroshnik for aid in aligning the measuring circuit and students O. V. Korobkov and V. Ye. Aleksandrov for aid in the measurements.

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ACC NR: AP6010402

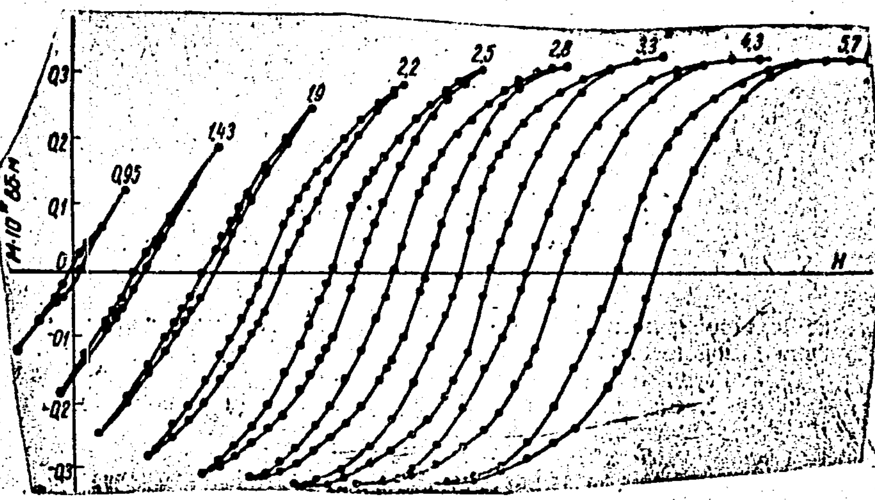

Fig. 2. Static hysteresis loops of film in transverse direction in the absence of superposed magnetization. The numbers indicate the field strength in A/cm. For each loop, the origin for reading H is at its center. M is the magnetic moment of the film.

Orig. art. has: 7 graphs and 1 formula.

SUB CODE: 09, 20/ SUBM DATE: 10May65/ ORIG REF: 007/ OTH REF: 009

Card 3/3 BLG

L 20736-66 EWT(d)/EWT(1)/EWT(m)/EWP(1)/EWP(t) IJP(c) GG/BB/JD

ACC NR: AP6011997 SOURCE CODE: UR/0126/65/019/004/0506/0513

AUTHOR: Polivanov, K. M.; Frumkin, A. L.; Khersonskiy, M. S.

ORG: Moscow Power Engineering Institute (Moskovskiy energeticheskiy institut) 33 B

TITLE: Hysteresis loops of thin magnetic films with 'negative' area

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 4, 1965, 506-513

TOPIC TAGS: hysteresis loop, magnetic thin film, magnetic circuit

ABSTRACT: When a thin magnetic film is acted upon by mutually perpendicular fields, a hysteresis loop can be formed with "negative" area. This phenomenon is analyzed on the basis of a model of homogeneous rotation. For small amplitudes of the alternating components of the fields an analytic calculation is performed for the area of the loop; and expressions are produced for this area, the power of the circuit, and the tangent of the angle of magnetic losses. All three quantities are negative, indicating a reverse flow of power. Under static conditions, experimental negative loops are produced which are in qualitative agreement with the theory. The expressions obtained for loop area, power, and u_2 are:

$$S = -\frac{B_S H_k \pi}{2} h_{ym}^2 \cdot h_{xm};$$

$$P = fS = \frac{\omega}{2\pi} S = -\frac{B_S H_k}{4} \omega h_{ym}^2 \cdot h_{xm};$$

Card 1/2 UDC: 538.23

Card 2/2

L 44285-65 EWT(d)/EWP(v)/EWP(k)/EWP(h)/EWP(l) Pf-4 GS

UR/0000/64/000/000/0421/0430 33 32

ACCESSION NR: AT5011615

B+1

AUTHOR: Netushil, A. V., Polivanov, K. M., Zharkov, F. P., Sokolov, V. A.

TITLE: Some peculiarities of the auto-oscillations in nonlinear automation elements

SOURCE: Vsesoyuznoye soveshchaniye po magnitnym elementam avtomatiki, telemekhaniki, izmeritel'noy i vychislitel'noy tekhniki. Lvov, 1962. Magnitnyye elementy avtomatiki, telemekhaniki, izmeritel'noy i vychislitel'noy tekhniki (Magnetic elements of automatic control, remote control, measurement and control engineering); trudy soveshchaniya. Kiev, Naukova dumka, 1964, 421-430

TOPIC TAGS: nonlinear automation element, multicycle oscillation period, parametric system oscillation, nonlinear oscillation, autooscillation, automatic control system, induction parametron 14

ABSTRACT: According to the modern theory of nonlinear system eigen oscillations (see, e.g., N. N. Bogolyubov, Yu. A. Mitropol'skiy, Asimptoticheskiye metody v teorii kolebaniy, Fizmatgiz, M., 1958), the behavior of the system often depends on the initial deviation from the equilibrium position. Nevertheless, this fact is often neglected during discussions of nonlinear elements utilized in automation devices, while, in actuality, such elements may have more than one eigen oscillation mode. It is shown in this article that

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one of the types of oscillation may sometimes occur only for initial deviations within a definite, quite narrow zone. The analysis of the discrete optimizer carried out by one of the authors (A. V. Netushil) showed the possibility of existence of stable eigen oscillations whose period contains not just two but several cycles. Such multicycle (four-cycle) oscillations possess definite associated criteria for their existence and require a specified initial elongation from the equilibrium position for their excitation. An analysis of the induction parametron (E. Goto, PIRE 1959, no. 8, 1304) shows that it can maintain a second level of parametric resonant oscillations distinct in amplitude from the first level oscillations. The probability pattern of the integral curves within the Van der Pohl plane indicates that this second level may be excited only by a fully defined sufficiently large initial displacement. All theoretical predictions have been confirmed by experiment (induction parametron) and the results of analog computer simulation. One should expect that higher oscillation levels will also be discovered in other parametric systems. Orig. art. has: 21 formulas and 12 figures.

ASSOCIATION: Kafedra teoreticheskikh osnow elektrotekhniki MEI (Department of the Theoretical Foundations of Electrical Engineering, MEI)

SUBMITTED: 29Sep64 ENCL: 00 SUB CODE: IE, EC

NO REF SOV: 012 OTHER: 003

Card 2/2

POLIVANOV, K.M.; FRUMKIN, A.L.; KHERSONSKIY, M.S.

Hysteresis loops of thin magnetic films with a "negative" area. Fiz. met. i matalloved. 19 no.4:506-513 Ap '65. (MIRA 18:5)

1. Moskovskiy energeticheskiy institut.

POLIVANOV, K.M.; POLLAK, B.P.

Resonance characteristics of a magnetically uniaxial polycrystalline ferrite in a superhigh-frequency field. Izv. AN SSSR. Ser. fiz. 28 no. 3:470-480 Mr '64. (MIRA 17:5)

ZHUKHOVITSKIY, Boris Yakovlevich; NEGNEVITSKIY, Iosif Borisovich; POLIVANOV, K.M., prof., red.

[Theoretical principles of electrical engineering in three parts] Teoreticheskie osnovy elektrotekhniki v trekh chastiakh. Moskva, Energiia. Pt.2. 1965. 238 p. (MIRA 19:1)

POLIVANOV, Konstantin Mikhaylovich, doktor tekhn. nauk, prof.

Determination of the stability of equilibrium points in ferroresonance. Izv. vys. ucheb. zav.; elektromekh. 8 no.11:1193-1196 '65. (MIRA 19:1)

1. Zaveduyushchiy kafedroy teoreticheskikh osnov elektrotekhniki Moskovskogo ordena Lenina energeticheskogo instituta.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341810018-4"

POLIVANOV, K. Yu.

BOGDANOV, O.S., doktor tekhnicheskikh nauk, professor, redaktor; BRAND, V.Yu.,
kandidat tekhnicheskikh nauk, redaktor; DERKACH, V.G., kandidat
tekhnicheskikh nauk, redaktor; DOLIVO-DOBROVOL'SKIY, V.V., doktor
tekhnicheskikh nauk, redaktor; ZAKHVATKIN, V.K., redaktor; KACHAN,
I.N., kandidat tekhnicheskikh nauk, redaktor; OLEVSKIY, V.A.,
kandidat tekhnicheskikh nauk, redaktor; LOKONOV, M.F., kandidat
tekhnicheskikh nauk, redaktor; PARFENOV, A.M., kandidat tekhnicheskikh
nauk, redaktor; PODNEK, A.K., redaktor; POLIVANOV, K.Yu., redaktor;
FINKEL'SHTEYN, G.I., kandidat tekhnicheskikh nauk, redaktor; FOMIN,
Ya.I., kandidat tekhnicheskikh nauk, redaktor; SHINYAKOV, M.I.,
redaktor; YUDENICH, G.I., doktor tekhnicheskikh nauk, redaktor;
BYKOV, G.P., redaktor; YEZDOKOVA, M.L., redaktor izdatel'stva;
EVENSON, I.M., tekhnicheskiy redaktor

[Proceedings of the Third Scientific Session of the Institute of
Mechanical Processing of Economic Minerals] Trudy III nauchno-
tekhnicheskoi sessii instituta Mekhanobr. Moskva, Gos.nauchno-
tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1955.
758 p. (MLRA 10:8)

1. Leningrad. Nauchno-issledovatel'skiy i proyektnyy institut
mekhanicheskoy obrabotki poleznykh iskopayemykh
(Ore dressing) (Flotation)

BORODKO, I.S.; ROSSIYSKIY, I.F.; POLIVANOV, M.N.

Crimping diaphragms on a hydraulic press with a metal die. Av. prom. 26 no.8:87-88 Ag '57. (MIRA 15:4)
(Diaphragms (Mechanical devices))

ALEKSANDROV, N.I.; GEFEN, N.Ye.; GAPOCHKO, K.G.; GARIN, N.S.; GORDON, G.Ya. KOZHUSHKO, M.I.; KORENEV, G.P.; LAZAREVA, Ye.S.; LEYKEKHMAN, Ye.P.; MASLOV, A.I.; PAVLOV, G.A.; POLIVANOV, N.D.; ROMANOV, P.S.; RYBAKOV, P.S.; RYBAKOV, M.G.; SAMOKHVALOV, M.F.; SMIRNOV, M.S.; SHTERN, M.A.; CHEPKOV, V.N.

Experience with mass aerosol immunization with tularemia dust vaccine. Zhur. mikrobiol., epid. i imm. 41 no. 2:36-43 F '64. (MIRA 17:9)

POLIVANOV, N. I.

"Concrete Bridges", published by State Publishers of Communal Economy Literature, Moscow, 1947

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POLIVANOV, N. I.

STRAMENTOV, A. YE. - Dör tekhn. nauk prof. i YEROSHEUSKIY, M. I. INZH. i VELIKOUSKIY, K. I. - Kand. tekhn. nauk i YAKSHIN, A. M. - Kand. tekhn. nauk i POLIVANOV, N. I. - Kand. tekhn. nauk

Akademiya Kommunal'nogo khozyaystva Im. K. D. Pamfilova

Problema primeneniya ulits dlya skorostnogo dvizheniya massovogo transporta v gorodakh SSSR Page 78

SO: Collection of Annotations of Scientific Research Work on Construction, completed in 1950.
Moscow, 1951

POLIVANOV, N.I.

GIBSHMAN, Ye.Ye., redaktor; DZHUNKOVSKIY, N.N., redaktor; YEGOROV, P.A., inzhener, redaktor; NITROPOL'SKIY, N.M., professor, redaktor; PUSHTORSKIY, Ye.I., inzhener; ROYER, Ye.N., inzhener; POLIVANOV, N.I., dotsent; KURDYUMOV, M.D., inzhener; OSTROVIDOV, A.M., inzhener; KROPOTOV, I.I., inzhener; VOLKOV, V.P., dotsent.

[Handbook on the planning, construction and operation of city roads, bridges and hydraulic structures] Spravochnik po proektirovaniiu, stroitel'stvu i ekspluatatsii gorodskikh dorog, mostov i gidrotekhnicheskikh sooruzhenii. Pod red. E.E.Gibshman, N.N.Dzhunkovskii, P.A.Egorov. Moskva, Izd-vo Ministerstva kommunal'nogo khoziaistva RSFSR. Vol. 1. [Bridges] Mosty. Pod red. N.M.Nitropol'skii, 1953. 984 p. (MLRA 7:1)

(Bridges) (Tunnels) (Retaining walls)

GIBSHMAN, Ye.Ye., professor; POLIVANOV, N.I., redaktor; TAMAROVICH, M.A., redaktor; KONYASHINA, A.D., tekhnicheskiy redaktor.

[The use of reinforced concrete to strengthen metal bridge spans] Primenenie zhelezobetona dlia usileniia proletnykh stroenii metallicheskikh mostov. Moskva, Izd-vo Ministerstva kommunal'nogo khoziaistva, 1954. 30 p. (MLRA 8:5)

(Bridges, Iron and steel) (Reinforced concrete)

ROSSIYSKIY, Vladimir Alekseyevich, prof.; NAZARENKO, Boris Pavlovich, kand. tekhn. nauk; SLOVINSKIY, Nikolay Aleksandrovich, kand. tekhn. nauk; GIBSHMAN, Ye.Ye., prof., doktor tekhn. nauk, retsenzent; KALMYKOV, N.Ya., doktor tekhn. nauk, prof., retsenzent[deceased]; POLIVANOV, N.I., prof., doktor tekhn. nauk, retsenzent; KIRILLOV, V.S., kand. tekhn. nauk, retsenzent; BASOV, S.Ye., inzh., retsenzent; PANKRATOV, V.M., inzh., red.; GANYUSHIN, A.I., red. izd-va; BODANOVA, A.P., tekhn. red.

[Examples of the design of precast reinforced concrete bridges] Primery proektirovaniia sbornykh zhelezobetonnykh mostov. Moskva, Avtotransizdat, 1962. 494 p. (MIRA 16:2)

1. Glavnyy spetsialist po mostam Khar'kovskogo otdeleniya Gosudarstvennogo proyektnogo instituta po promyshlennomu transportu (for Basov).

(Bridges, Concrete--Design and construction)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341810018-4"

SLAVUTSKIY, Aleksandr Kel'manovich; BABKOV, V.F., doktor tekhn. nauk, prof., retsenzent; POLIVANOV, N.I., doktor tekhn.nauk, prof., retsenzent; KALUZHSKIY, Ya.A., doktor tekhn. nauk, prof., retsenzent; KRUTETSKIY, Ye.V., dots., red.; OVSYANNIKOVA, Z.G., red.izd-va; MURASHOVA, V.A., tekhn. red.

[Rural roads] Sel'skokhoziaistvennye dorogi. Moskva, Vysshaia shkola, 1963. 466 p. (MIRA 16:6)
(Road construction)

POLIVANOV, Nikolay Ivanovich, doktor tekhn. nauk, prof.; GOLUBKOVA, Ye.S., red.; GRONDA, V.I., red.

[New systems of automobile and city reinforced concrete bridges] Novye sistemy avtodorozhnykh i gorodskikh zhelezobetonnykh mostov. Moskva, Rosvuzizdat, 1963. 48 p. (MIRA 17:5)

POLIVANOV, N.I., doktor tekhn. nauk, prof.; GRONDA, V.I., red.; YASHUKOVA, N.V., tekhn. red.

[Designing prestressed spans for reinforced concrete automobile bridges] Raschet predvaritel'no napriazhennykh proletnykh stroenii zhelezobetonnykh avtodorozhnykh mostov. Moskva, Rosvuzizdat, 1963. 63 p. (MIRA 17:3)

FEDOROV, B. F.; MITKEVICH, Vladimir Fedorovich and POLIVANOV, M. K.

POLIVANOV, M. K.

"Questions of Lighting of the Great Projects of Communism," Electricity, Publ. by the Printing House of the Govt. Energy (Electrical) Publ. House, in Moscow, 1952.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001341810018-4"

POLIVANOV, M.K.

USSR/Physics

Card 1/1 Pub. 22 - 7/47

Authors : Polivanov, M. K.

[redacted]

Title : About a new derivation of equations for Green's functions in quantum electrodynamics.

Periodical : Dok. AN SSSR, 100/6, 1061-106, Feb 21, 1955

Abstract : A new way for obtaining equations of the Green functions for quantum electrodynamics is discussed. It was found that the basic formula could be derived by a much simpler way (without the use of the quantum dynamical principle and of the external spinner sources), if the method of variational derivatives combined with a modified Wick's technique would be applied for the above-mentioned purpose. Three references: 1 USA 2 British (1950-1954).

Institution : The M. V. Lomonosov State University, Moscow.

Presented by: Academician N. N. Bogolyubov, October 28, 1954

Polivanov, M.K.

20-6-13/42

AUTHOR: Polivanov, M. K.

TITLE: Relations of Dispersion for the Scattering of K-Mesons on Nucleons (Dispersionnyye sootnosheniya dlya rasseyaniya K-mezonov na nuklonakh)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 6, pp. 943 - 945 (USSR)

ABSTRACT: The author analyses here the dispersion relations for the scattering processes $K + N \longrightarrow K + N$ and $\tilde{K} + N \longrightarrow \tilde{K} + N$, without staying with the known details. Hereby the K-meson is assumed as scalar (θ-meson), or pseudoscalar (τ-meson) and a corresponding field $\varkappa_\varsigma(x)$ is adjoined. The index ς numbers the four states which are linearly connected with the particles K^+, K^0, $\tilde{K}^0$, $\tilde{K}^-$ and which distinguish by the projection of the isotopic spin and by the sign of the hyper-charge (or the strangeness). These 4 fields form a binary spinor in the isotopic space, similar to the four functions of the nucleons and antinucleons. The author investigates here the interaction of K-mesons with nucleons of Yukawa (Yukava)-type $N \longleftrightarrow K + Y$, $Y \longleftrightarrow N + \tilde{K}$. The other possible interactions do not become apparent in the dispersion relations. First a term for the amplitude of the scattering process $K + N \longrightarrow K + N$ is written down. The course of the calculus is followed and in this way 4 dispersion

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20-6-13/42

Relations of Dispersion for the Scattering of K-Mesons on Nucleons

relations are obtained for the amplitudes with different symmetries. One of these relations is explicitly written down here. Even after elimination of the negative energies the interval of integration contains the $0 < E < \sqrt{m^2 + p^2}$ which has no relation to the scattering states and which therefore cannot be determined from the scattering experiments. The mass spectrum of the possible intermediary states proves to be essential. The laws of conservation of the strangeness and of the nucleon-charge allow the following states: Hyperon Y (Λ and Σ), Hyperon and π-meson ($Y + \pi$) nucleon and K-meson $(N + K)^*$, etc. The state Y relates to the discreet spectrum the contribution of which can be easily computed. This contribution is proportional to the square of the constant of the interaction NKY. The term for the symbolically written down contribution of the hyperon at pseudoscalar coupling is given as an example. If any other interactions afe assumed, e.g. the direct interaction of pions with K-mesons, then they must not be explicitly taken into consideration in the dispersion relations. Consequently, if the contribtuion originating from the hyperon-pole is known, the constants in the interaction YKN can be estimated. Unfortunately, this result is rendered somewhat indistinctly due to a contribution coming from a part of the continuous spectrum. There are 1 figure, and 2 references, 1 of which is Slavic.

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20-6-13/42

Relations of Dispersion for the Scattering of K-Mesons on Nucleons

ASSOCIATION: United Institute for Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

PRESENTED: May 15, 1957, by N. N. Bogolyubov, Academician

SUBMITTED: May 11, 1957

AVAILABLE: Library of Congress

Card 3/3

BOGOLYUBOV, Nikolay Nikolayevich, MEDVEDEV, Boris Valentinovich, POLIVANOV, Mikhail Konstantinovich,; SHIRKOV, D.V., red.; TUMARKINA, N.A., tekhn. red.

[Problems in the theory of dispersion relations] Voprosy teorii dispersionnykh sootnoshenii. Moskva, Gos. izd-vo fiziko-matematicheskoi lit-ry, 1958. 202 p. (MIRA 11:11)

(Field theory)

POLIVANOV, M.K.

Processes involved in the production of heavy mesons and hyperons as considered on the basis of the dispersion relations. Dokl. AN SSSR. 118 no.4:679-682 F '58. (MIRA 11:4)

1. Predstavleno akademikom N.N. Bogolyubovym.
(Particles, Elementary)

SOV/20-121-4-14/54

24(0)

AUTHORS: Medvedev, B. V., Polivanov, M. K.

TITLE: On a Classical Model of an Indefinite Metric (Ob odnoy klassicheskoy modeli indefinitnoy metriki)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 4, pp 623-626 (USSR)

ABSTRACT: In a previous paper, N. N. Bogolyubov and the author suggested to use an indefinite metric in problems of quantum field theory. The purpose of this paper is the explanation of the meaning of this method by investigation of a certain analogy which was formulated according to the classical field theory. The authors investigate 2 classical fields, for instance the complex field $\psi(x)$ and the real field $\chi(x)$ with the Lagrangian interaction $\mathcal{L}_{int} = g\int \overset{*}{\psi}(x)\,\psi(x)\,\chi(x)dx.$ The field $\psi(x)$ is assumed to be a true physical field, but the field $\chi(x)$ - a fictive one. The latter may be represented as an expansion:

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On a Classical Model of an Indefinite Metric SOV/20-121-4-14/54

$\chi(x) = \sum_{(n)} c_n \chi_n(x)$. Evidently, the fields with a negative energy (or, what is the same, fields with the inverse sign before the Lagrangian of the free field) are the analogon of the "fields with indefinite norm" of the classical theory. The complete Lagrangian which corresponds to these assumptions is given explicitly, and then the field equations are deduced by variation:

$$(\Box - M^2)\,\psi(x) = -\,g \sum_{(n)} c_n\,\varphi_n(x)\,\psi(x) = -\,J(x)$$

$$(\Box - m_n^2)\,\varphi_n(x) = -\,gc_n\,\varepsilon_n\,\overset{*}{\psi}(x)\,\psi(x) = -\,j_n(x).$$

The latter of these 2 equations may be transformed to an integral form deduced for the fields with the masses m_n. The fictive fields(although they may have energy, momentum and other dynamic characteristics) are assumed to be unable to exchange these characteristics with the physical fields. The authors then give some conditions which correspond to the above-mentioned assumption. One of these conditions allows the elimination of the non-physical field $\varphi_n(x)$ and makes it possible to operate only with the physical field $\psi(x)$.

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This leads to the Lagrangian of interaction

$$\mathcal{L}_{int} = g^2 \int \psi(x) \overset{*}{\psi}(x) \; K(x - x') \psi(x') \overset{*}{\psi}(x') \; dx \, dx'$$

and to the field equations

$(\Box - M^2) \psi(x) = - g^2 \int dx' \overset{*}{\psi}(x') \psi(x) \; K(x - x') \psi(x)$ where the kernel $K(x - x') = \sum_{(n)} \varepsilon_n \, c_n^2 \, \overline{D}_n(x - x')$ is represented as a sum (or as an integral if one introduces a continuous variety of fictive fields) of symmetric Green (Grin) functions $\overline{D}_n(x - x')$ with different masses m_n. K may be chosen as a singular nucleus (or, in the required degree) as a regular one. Elimination of the non-physical field $\varphi_n(x)$ from the initially local field leads to a typically non-local theory. The non-local character of the field equations is connected essentially with the superimposing of a non-local condition which is given in this paper. In quantum theory, these

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On a Classical Model of an Indefinite Metric SOV/20-121-4-14/54

additional conditions may be superimposed on the field operators or they may be considered as conditions for the maximum permissible amplitudes of state. The authors thank N. N. Bogolyubov for his useful advice. There are 4 references, 1 of which is Soviet.

ASSOCIATION: Matematicheskiy institut im. V. A. Steklova Akademii nauk SSSR (Mathematical Institute imeni V. A. Steklov AS USSR) Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research)

PRESENTED: March 18, 1958, by N. N. Bogolyubov, Academician

SUBMITTED: March 8, 1958

Card 4/4

SOV/20-127-3-16/71

24(5), 24(7)

AUTHORS: Medvedev, B. V., Polivanov, M. K.

TITLE: Spectral Conditions as a Possibility of Renormalization

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 3, pp 537-540 (USSR)

ABSTRACT: The difficulties connected in the quantum field theory and in quantum electrodynamics with the occurrence of a logarithmic pole in the negative, a so-called immaterial state, have as yet not permitted a solution of the problem. The presence of a logarithmic pole in the expression for Green's function is in contradiction to the general physical conceptions concerning the spectral theorems of Källén and Lehmann (Ref 6). Redmond (Ref 7) developed a method of transforming Green's functions, so that they came to agree with the spectral theorems. This process of transformation may have three reasons, of which in the present paper the first case, such as presented by Lee's model, is dealt with: If the exact solution has the non-physical pole, the transformation must lead to a modification of the Hamiltonian. The exact renormalized Green's function for V-particles reads:

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$G_V(\omega) = g(\omega - m)$; $g(x) = \lim \tilde{g}(x+i\varepsilon)$; $\tilde{g}(z) = \frac{1}{h(z)}$; Im $x = 0$,

with $h(z) = z\left\{1 + \frac{g^2}{(2\pi)^2} z \int_{\mu}^{\infty} f^2(\omega) \frac{\sqrt{\omega - \mu^2}\, d\omega}{\omega^2(\omega - z)}\right\}$. It possesses in the function $g(x)$ a non-physical pole at $x = \lambda$. $\tilde{g}(z)$ is analytical within the entire complex plane except in $z = 0$ and along the real axis. For $\tilde{g}(z)$ it holds for $z \to \infty$: $\tilde{g}(z) \to (zN^2)^{-1}$, $N^2 < 0$. Cauchy's theorem is applied to $\tilde{g}(z)$ (with the exception of the real axis), and the spectral representation of $\tilde{g}(z)$ then has the following form:

$$\tilde{g}(z) = \int_{-\lambda}^{\infty} \frac{\bar{I}(x)dx}{z - x} = -\frac{1}{(z+\lambda)N_\lambda^2} + \frac{1}{z} + \int_{\mu}^{\infty} \frac{I(x)dx}{z-x} \qquad (4).$$

This spectral representation contains the non-physical part in $\bar{I}(x)$. The "Redmondization" consists in the fact that for

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$\tilde{g}(z) \rightarrow \tilde{g}'(z) = \tilde{g}(z) + \frac{1}{(z+\lambda)N_\lambda^2}$ is put. In this manner the normalized Green's function $\tilde{g}(z) = \frac{1}{z} + \int_{\mu}^{\infty} \frac{I(x)dx}{z-x}$, which corresponds to the Källen-Lehmann theorem is found. It is shown that it differs only by the expression $F(x) \rightarrow F'(x)$, and the latter only by the introduction of the new form factor $f'(\omega)$, i.e. the Redmondized function $g'(x)$ therefore at first leads back to the Hamiltonian used. A renormalizing constant is then introduced, by which the new form factor is determined. The latter avoids apparent renormalization and, consequently, the "immaterial" state. Furthermore, the special case is briefly discussed, in which $f'(\omega) = 1$. In the case of extremely high energies $\omega \sim \lambda$, the form factor acquires resonance character. In conclusion, the authors thank N. N. Bogolyubov and D. V. Shirkov for discussing the results obtained, and P. Redmond for sending

SOV/20-127-3-16/71

Spectral Conditions as a Possibility of Renormalization

his preprint. There are 7 references, 3 of which are Soviet.

ASSOCIATION: Matematicheskiy institut im. V. A. Steklova Akademii nauk SSSR (Mathematical Institute imeni V. A. Steklov of the Academy of Sciences, USSR). Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: April 11, 1959, by N. N. Bogolyubov, Academician

SUBMITTED: April 8, 1959

Card 4/4

24(3),24(5) SOV/155-58-3-35/37

AUTHORS: Medvedev,B.V.,and Polivanov,M.K.

TITLE: Renormalization in the Theory of an Indefinite Metric (Perenormirovka v teorii s indefinitnoj metrikoy)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 3, pp 203-214 (USSR)

ABSTRACT: In [Ref 1] N.N.Bogolyubov and the authors proposed to construct a regular field theory with the aid of the indefinite metric. In the present paper the authors consider the questions of renormalization of this theory. Here the following question is not essential: From the covariant formalism of Tomanaga-Schwinger and from the theory of renormalization for the additions of the fermion masses it follows

(1) $\Delta M \sim \alpha M \ln\left(\frac{\mu}{M}\right)$, $\mu = \frac{1}{\lambda}$, $\alpha = \frac{e^2}{\hbar c} = \frac{1}{137}$.

On the other hand the classical electrodynamics yields

(2) $\Delta M \sim \frac{\alpha}{\lambda} = \alpha\mu$

for the electron mass, where (2) describes very well the masses of most elementary particles (in the sense of the modern imagination of the existing interactions). The authors have the

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MEDVEDEV, B.V.; POLIVANOV, M.K.

Renormalization in the theory with an indefinite metric. Nauch.dokl. vys.shkoly; fiz.-mat.nauki no.3:203-214 '58. (MIRA 12:7)

1. Matematicheskiy institut AN im. V.A. Steklova.
(Field theory)

SOV/1217

PHASE I BOOK EXPLOITATION

16,24(5)

Bogolyubov, Nikolay Nikolayevich; Medvedev, Boris Valentinovich; and Polivanov, Mikhail Konstantinovich

Voprosy teorii dispersionnykh sootnosheniy (Problems of the Theory of Dispersion Relations) Moscow, Fizmatgiz, 1958. 202 p. (Series: Sovremennyye problemy matematiki) 6,500 copies printed.

Ed.: Shirkov, D.V.; Tech. Ed.: Tumarkina, N.A.

PURPOSE: This book is intended for persons working in the quantum field theory who are interested in the method of dispersion relations and its mathematical structure.

COVERAGE: The book contains a detailed presentation of the mathematical structure of the method of dispersion relations. The main problems studied are the method of determining dispersion relations with the exactness needed in ordinary physics work, physical assumptions necessary for obtaining the dispersion relations, and to what degree dispersion relations are con-

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16(1), 24(5)

SOV/155-58-2-31/47

AUTHORS: Bogolyubov, N. N., Medvedev, B. V., and Polivanov, M. K.

TITLE: On the Question on the Indefinite Metric in the Quantum Field Theory (K voprosu ob indefinitivnoy metrike v kvantovoy teorii polya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 2, pp 137-142 (USSR)

ABSTRACT: The authors join the well-known publication of Heisenberg [Ref 2] in which the "physical" states with a positive norm are completed by "unphysical" states with a negative norm; in the Hilbert space of the state amplitudes this can be reached by the introduction of an indefinite metric. The authors investigate the possibilities resulting in the theory by the introduction of an indefinite metric. According to Heisenberg, the field is represented as a sum of a physical field $\psi(x)$ and a number of fictive fields $\psi_n(x)$. The corresponding state space H then is divided into a subspace H_1 containing only the physical particles of the type ψ, and into its orthogonal complement H_2: $H = H_1 + H_2$. The arising specific difficulty (appearance of "unphysical" states in the asymptotic

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AUTHOR: Polivanov, M. K. 20-118-4-15/61

TITLE: The Processes of the Production of Heavy Mesons and Hyperons on the Basis of Dispersion Relations (Protsessy porozhdeniya tyazhelykh mezonov i giperonov s tochki zreniya dispersionnykh sootnosheniy)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 4, pp. 679-682 (USSR)

ABSTRACT: The present paper investigates the amplitudes of the processes $\gamma + N \longrightarrow K + Y$ (photoproduction) and $\pi + N \longrightarrow K + Y$ (π-production) on the basis of the dispersion relations, which permits a partial clearing of the characteristic features of these processes and of the part played by the various participating interactions. The "retarded" amplitude for the description of the photoproductions of K-mesons is explicitly written down here. The author here employs the operators of the K-meson current and of electromagnetic current. For the retarded amplitude $T^{ret}(1)$ it is possible to write down dispersion relations. The author introduces a

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certain coordinate system suited for the determination of the dispersion relations, which furnishes equal values for the energies of the initial and final light particles: $k^o = q^o$. Expressions are written down for the threshold energy of the reaction as well as for the imaginary part of the amplitude. This imaginary part is expanded according to the complete system of the intermediary states, and the momenta of the intermediary state are exactly determined by δ functions. If $|E| < E_{thr}$ the momenta of the intermediary state remain complex. The one-particle states of nucleon and hyperon furnish the so-called pole-contributions, which are computed accurately. From a two-particle-state onward, however (nucleon + pion and hyperon + pion) a continuous spectrum has to be dealt with. The "mass" of the intermediary state comprising two particles consists of the sum of the mass of the particles and of the kinetic energy of their relative motion. The expressions for the nucleon branch and for the hyperon branch of the spectrum are written down. The continuous

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The Processes of the Production of Heavy Mesons and Hyperons on the Basis of Dispersion Relations

spectrum also takes a considerable proportion of the dispersion relations for the scattering of K-mesons on nucleons. The inevitable and essential share of the states of the continuous spectrum is a characteristic feature of all processes with K-mesons and hyperons. It is not permitted to refrain from the investigation of the processes with a π binding in processes with k-binding, it is necessary, on the contrary, to investigate both interactions simultaneously. This circumstance is disfavorable for the application of perturbation theory with respect to the constant G of the K-interaction. It is possible to determine the character of the interrelation of these two interactions more accurately, in a formula given here, when the structure of the two-particle terms, which furnish a share in the continuous spectrum, is investigated. The various processes are connected by a domain inaccessible to observation, when they are described by dispersion relations.

There are 1 figure, and 5 references, 3 of which are Soviet.

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20-118-4-15/61

The Processes of the Production of Heavy Mesons and Hyperons on the Basis of Dispersion Relations

PRESENTED: August 17, 1957, by N. N. Bogolyubov, Member of the Academy

SUBMITTED: August 16, 1957

AVAILABLE: Library of Congress

Card 4/4

POLIVANOV, M. K.: ~~Master~~ Cand Phys-Math Sci (diss) -- "On the method of dispersion relations as applied to the interaction of K-mesons with nucleons and hyperons". Moscow, 1958. 8 pp (Acad Sci USSR, Math Inst im V. A. Steklov), 150 copies (KL, No 6, 1959, 125)

MEDVEDEV,B.V.; POLIVANOV, M.K.

On the degrees of growth of matrix elements in the axiomatic method. Dubna, Ob"edinennyi in-t iadernvkh issl. 1961. 19 p.

1. V.A.Stekloff Mathematical Institute of the Academy of Science, Moscow, USSR (for Polivanov).
(No subject heading)

28928
S/056/61/041/004/012/019
B113/B112

24.7100 (1153, 1160, 1454)

AUTHORS: Medvedev, B. V., Polivanov, M. K.

TITLE: Degrees of growth of matrix elements in an axiomatic method

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 4(10), 1961, 1130 - 1141

TEXT: The authors study the degree of arbitrariness in which the degrees of growth can be indicated for different matrix elements. The study of the simple case of a self-acting field with spin 0 may be conducted without using the perturbation theory. The matrix elements of the transitions between states on the energy surface of the two Hermitian operators J and J(x) are interrelated by

$$J(p, p_1, \ldots, p_l; q_1, \ldots, q_s) = P\left(\frac{'q_1}{q_2, \ldots, 'q_s}\right) \delta(p - q_1) J(p_1, \ldots, p_l; q_2, \ldots, q_s) - \frac{i}{(2\pi)^{3/2}\sqrt{2p^0}} \int dx\, J(x \mid p_1, \ldots, p_l; q_1, \ldots, q_s) \exp\left\{i\left(p + \frac{P-Q}{2}\right)x\right\}, \quad (9')$$

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$$J(p_1, \ldots, p_l; q, q_1, \ldots, q_s) =$$
$$= P\left(\frac{p_1}{p_1, \ldots, p_l}\right) \delta(p_1 - q) J(p_2, \ldots, p_l; q_1, \ldots, q_s) -$$
$$- \frac{1}{(2\pi)^{3/2} \sqrt{2q^0}} \int dx J(x | p_1, \ldots, p_l; q_1, \ldots, q_s) \exp\left\{i\left(-q + \frac{P-Q}{2}\right)x\right\}, \quad (9'')$$

and

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$J(x) - J(-x) = i\{j(x/2)j(-x/2) - j(-x/2)j(x/2)\}$ (10). The operator $J(x)$ is additionally restricted by the causality condition. $J(x) \doteq 0$ for $x \lesssim 0$ (11). (9) - (11) constitutes a system of equations for determining the matrix elements of operators $J(x)$ and J. J is the Heisenberg operator of the current, and $J(x)$ is a delaying radiation operator. The matrix elements of J contain one momentum $P-Q \neq 0$, $P = \sum_1^l p_i$, $Q = \sum_1^s q_j$, and the matrix elements of $J(x)$ contain two such momenta which do not lie on the energy surface. To eliminate $J(x)$ from the system, the modified Eq. (10) is multiplied by $\theta(x^0)$ taking account of (11). One substitutes the resultant equation into (9'), and obtain an infinite system of interrelated equations and an analogous system derived from (9''). For relativistic-

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invariant matrix elements, the basic system has the form

$$I(p, p_1, \ldots, p_l; q_1 \ldots, q_s) =$$
$$= P\left(\frac{q_1}{q_2, \ldots, q_s}\right)\sqrt{2p^0 2q_1^0}\,\delta(\mathbf{p}-\mathbf{q}_1)\, I(p_1, \ldots, p_l; q_2, \ldots, q_s) -$$
$$-(2\pi)^{3/2}\sum_{\nu}^{\infty}\frac{1}{\nu!}\int\frac{d\mathbf{k}_1\ldots d\mathbf{k}_\nu}{2k_1^0\ldots 2k_\nu^0} I(p_1, \ldots, p_l; k_1, \ldots, k_\nu)\, I(k_1, \ldots, k_\nu; q_1, \ldots, q_s)\times$$
$$\times\left\{\frac{\delta(\mathbf{p}+\mathbf{P}-\mathbf{K})}{K^0-P^0-p^0-i\varepsilon}-\frac{\delta(\mathbf{p}-\mathbf{Q}+\mathbf{K})}{-K^0+Q^0-p^0-i\varepsilon}\right\}. \quad (16')$$

$$I(p_1, \ldots, p_l; q, q_1, \ldots, q_s) =$$
$$= P\left(\frac{p_1}{p_2, \ldots, p_l}\right)\delta(\mathbf{p}_1-\mathbf{q})\sqrt{2p_1^0 2q^0}\, I(p_2, \ldots, p_l; q_1, \ldots, q_s) -$$
$$-(2\pi)^{3/2}\sum_{\nu}^{\infty}\frac{1}{\nu!}\int\frac{d\mathbf{k}_1\ldots d\mathbf{k}_\nu}{2k_1^0\ldots 2k_\nu^0} I(p_1, \ldots, p_l; k_1, \ldots, k_\nu)\, I(k_1, \ldots, k_\nu; q_1, \ldots, q_s)\times$$
$$\times\left\{\frac{\delta(-\mathbf{q}+\mathbf{P}-\mathbf{K})}{K^0-P^0+q^0-i\varepsilon}-\frac{\delta(-\mathbf{q}-\mathbf{Q}+\mathbf{K})}{-K_0+Q^0+q^0-i\varepsilon}\right\}. \quad (16'')$$

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Degrees of growth of matrix elements... B113/B112

is analogously obtained from (9''). Further, the total degree of growth is considered for steady extension of all momenta. It is demanded that a finite index of growth (a minimum integer $\omega(l,s)$) should exist for each matrix element l and s with momenta of any kind, so that with an extension of all momenta $p_1 = \xi_1 P, \ldots, p_l = \xi_l P$, $q_1 = \eta_1 P, \ldots, q_s = \eta_s P$, $P \to \infty$ (21) the matrix element $I(p_1, \ldots, p_l; q_1, \ldots, q_s)$ grows more slowly than $P^{\omega(l,s)+\alpha}$ for any $\alpha > 0$. Theories in which this condition is fulfilled are called renormalizable theories. The question is studied as to whether (16) is restricted in the choice of the numbers $\omega(l,s)$. It follows from (16) that

$$\omega(l+1, s) \geqslant \omega(l, v) + \omega(v, s) + 2v - 4, \qquad (23')$$

$$\omega(l, s+1) \geqslant \omega(l, v) + \omega(v, s) + 2v - 4, \qquad (23'')$$

where $v \geqslant 1$, $l + s \geqslant 1$, $v + l \geqslant 2$, $v + s \geqslant 2$ (24). Since, however, $\omega(l,s) = \Omega(l+s)$, one obtains $\Omega(l + s + 1) \geqslant \Omega(l + v) + \Omega(v + s) + 2v - 4$ (27). A partial solution is given by $\Omega_0(n) = 3 - n$, the general solution by $\Omega(n) = 3 - n + N(n)$.

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Thus, the basic system of inequalities has the form $N(l + s + 1) \geqslant N(l + \nu) + N(s + \nu)$. The upper bound of $\Omega(n)$ is given by $\Omega_0(n) = 3 - n$ for all $n \geqslant 2$, the lower bound of $N(n)$ by $N(2) + (n - 2)N(2) = (n - 1)N(2)$. Particularly close restrictions occur in so-called self-renormalizable theories for which the conditions (23) assume the form

$$\omega(l+1, s) = \max_{\nu}\{\omega(l, \nu) + \omega(\nu, s) + 2\nu - 4\},$$
$$\omega(l, s+1) = \max_{\nu}\{\omega(l, \nu) + \omega(\nu, s) + 2\nu - 4\}. \qquad (39)$$

and (30) the form $N(l + s + 1) = \max\{N(l + \nu) + N(s + \nu)\}$ (40). The solution of system (40) has the form $N(2k) = -a$, $N(2k + 1) = 0$, where $k \leqslant n + 1$, and a is an arbitrary integral non-negative number. The general expression for the possible indices of the degrees of growth of the matrix elements I in the self-renormalizable theory has the form $\Omega(2k) = 3 - 2k - a$, $\Omega(2k + 1) = 2 - 2k$, $a \geqslant 0$, $a \in N$. The authors thank N. N. Bogolyubov, V. S. Vladimirov, and I. F. Ginzburg for discussions and remarks. Shirkov is mentioned. There are 11 references: 6 Soviet and 5 non-Soviet. The

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AUTHORS: Medvedev, B. V., and Polivanov, M. K.

TITLE: The role of renormalization terms in an approach to the quantum-field theory with the aid of dispersion

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 5, 1962, 1071 -1074

TEXT: In a previous paper (ZhETF, 41, 1130 (1961)) the authors expressed the opinion that non-trivial solutions in the quantum-field theory may be discovered only on account of the renormalization terms necessary in connection with the infinities. This is demonstrated in the present paper in which the mass renormalization terms are studied. From the system

$$I(p,(p)_l;(q)_s) = P\left(\frac{q_1}{(q)_{s-1}}\right)\sqrt{2p^0 2q_1^0}\,\delta(p-q_1)\,I((p)_l;(q)_{s-1}) - (2\pi)^{3/2}\sum_{\nu}^{\infty}\frac{1}{\nu!}\int\frac{(dk)_\nu}{(2k^0)_\nu}\,I((p)_l;(k)_\nu)\,I((k)_\nu;(q)_s)\times$$
$$\times\left\{\frac{\delta(p+\sum p_l-\sum k_\nu)}{\sum k_\nu^0-\sum p_l^0-p^0-i\varepsilon}-\frac{\delta(p-\sum q_j+\sum k_\nu)}{-\sum k_\nu^0+\sum q_j^0-p^0-i\varepsilon}\right\};$$

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The role of renormalization...

$$I((p)_l;\,q,(q)_s) = P\left(\frac{p_1}{(p)_{l-1}}\right)\sqrt{2p_1^0 2q^0}\,\delta(p_1-q)\,I((p)_{l-1};(q)_s) - (2\pi)^{3/2}\sum_{\nu}^{\infty}\frac{1}{\nu!}\int\frac{(dk)_\nu}{(2k^0)_\nu}\,I((p)_l;(k)_\nu)\,I((k)_\nu;(q)_s)\times$$
$$\times\left\{\frac{\delta(-q+\sum p_l-\sum k_\nu)}{\sum k_\nu^0-\sum p_l^0+q^0-i\varepsilon}-\frac{\delta(-q-\sum q_j+\sum k_\nu)}{-\sum k_\nu^0+\sum q_j^0+q^0-i\varepsilon}\right\}.$$

studied in the above-mentioned paper and from the stability conditions of single-particle states the authors conclude that, in the absence of mass renormalization terms, all the matrix elements of the structures $I(p)_1;-)$ or $I(-;(q)_1)$ become zero. This paradoxon is explained as follows: The absence of renormalization terms is essential in the reasoning conducted here. This could be proved if all the integrals of Eq. (1) were convergent. It is concluded that it is impossible to elaborate a non-trivial local theory without divergences. Nature can be described within the framework of a local theory only by a theory with divergences. Even in the presence of a mass renormalization term it is impossible to avoid

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AMBARTSUMYAN, V.A., akademik; ASRATYAN, E.A.; BOGOLYUBOV, N.N., akademik; VINOGRADOV, A.P., akademik; GINETSINSKIY, A.G.; KNUNYANTS, I.L., akademik; KOCHETKOV, N.K.; KURSANOV, A.L., akademik; MEL'NIKOV, O.A.; NESMEYANOV, A.N., akademik; NESMEYANOV, An.N., doktor khim. nauk; OBREIMOV, I.V., akademik; POLIVANOV, M.K., kand.fiz.-mat.nauk; REUTOV,O.A.; RYZHKOV, V.L.; SPITSIN, V.I., akademik; TAMM, I.Ye., akademik; FESENKOV, V.G., akademik; FOK, V.A., akademik; SHCHERBAKOV, D.I., akademik; FRANK, I.M.; FRANK, G.M.; KHOKHLOV, A.S., doktor khim. nauk; SHEMYAKIN, M.M., akademik; ENGEL'GARDT, V.A., akademik; SHAPOSHNIKOV, V.N., akademik; BOYARSKIY,V.A.; LIKHTENSHTEYN, Ye.S.; VYAZEMTSEVA, V.N., red.izd-va; KLYAYS, Ye.M., red.izd-va; TARASENKO, V.M., red.izd-va; POLYAKOVA, T.V., tekhn. red.

[As seen by a scientis: From the Earth to galaxies, To the atomic nucleus, From the atom to the molecule, From the molecule to the organism] Glazami uchenogo: Ot Zemli do galaktik, K iadru atoma domolekuly, Ot molekuly do organizma. Moskva, Izd-vo AN SSSR, 1963. 736 p. (MIRA 16:12)

1. Akademiya nauk SSSR. 2. Chlen-korrespondent AN SSSR (for Asratyan, Ginetsinskiy, Kochetkov, Mel'nikov, Reutov, Ryzhkov, Frank,I.M., Frank, G.M.)
(Astronomy) (Nuclear physics) (Chemistry) (Biology)

ZAV'YALOV, O.I.; POLIVANOV, M.K.; KHORUZHIY, S.S.

Analytic properties of the amplitude in the quasi-potential scattering problem. Zhur. eksp. i teor. fiz. 45 no.5:1654-1659 N '63. (MIRA 17:1)

1. Matematicheskiy institut AN SSSR.

POLIVANOV, M.K.; KHORUZHIY, S.S.

Spectral represenations in the quasi-optical approach. Zhur. eksper. i teor. fiz. 46 no.1:339-353 Ja'64. (MIRA 17:2)

1. Matematicheskiy institut AN SSSR.

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AUTHORS: Polivanov, M. K.; Khoruzhiy, S. S.

TITLE: Spectral representations in the quasioptical approach

SOURCE: Zhurnal eksper. i teoret. fiz., v. 46, no. 1, 1964, 339-353

TOPIC TAGS: elementary particle scattering, potential description of scattering, two particle unitarity condition, scattering amplitude complex scattering potential, Mandelstam representation, dispersion relations, one dimensional dispersion relations, crossing symmetry relations

ABSTRACT: In an attempt to unify the potential description of elementary particle scattering with the two-particle unitarity condition, the analytic properties of the scattering amplitude as a function of the energy and the momentum transfer are investigated in the quasioptical approach, i.e., formulated as a potential scattering problem with a complex potential and an equation that implies

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the relativistic two-particle unitarity condition. The approach is similar to that used by B. A. Arbuzov et al. (Preprint, OIYaI R-1318; ZhETF, in print), and the Fredholm series method is used. It is shown that the two-particle unitarity condition of quantum theory is incompatible in the framework of the quasipotential approach with the requirement of maximal analyticity in the form of the existence of a Mandelstam representation, but the total scattering amplitude admits of one-dimensional dispersion relations in each variable, with the other variables maintained fixed within a certain range. The effect of crossing symmetry is considered. "In conclusion the authors express sincere gratitude to N. N. Bogolyubov who called their attention to the importance of this problem and also to N. N. Bogolyubov, A. A. Logunov, A. N. Tavkhelidze, V. S. Vladimirov, and O. I. Zav'yalov for fruitful discussions. Orig. art. has: 48 formulas.

ASSOCIATION: Matematicheskiy institut im. V. A. Steklova AN SSSR

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